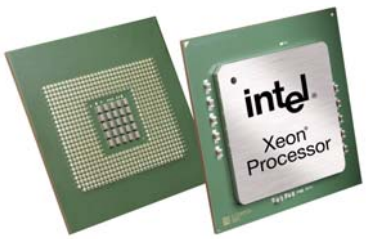
Increase MP Performance

WITH PLATFORMS BASED ON THE DUAL-CORE
INTEL® XEON® PROCESSOR 7000 SEQUENCE

Introducing Intel's first chipset architected for four dual-core processors.



The Intel® E8501 chipset has higher performance and more scalability than prior generations of the Intel® Xeon® processor family. The Intel E8501 chipset enables performance gains on Intel's seventh-generation four-way MP platform of up to 60% projected performance increase over previous-generation single-core processors based on Intel initial preliminary testing,[1] making the platform well-suited for running demanding, multi-threaded applications, such as databases, financial services, and supply-chain management.

With Intel built in, your company has confidence built in. The chipset is designed for longevity—architected for the Dual-Core Intel® Xeon® processor 7000[2] sequence, yet also compatible with Intel® single-core processors—for an enhanced lifespan and for helping to lower Total Cost of Ownership (TCO). The chipset's ability to support 64-bit as well as 32-bit applications lets you leverage your investment even further. It also offers increased bandwidth, and greater flexibility, manageability, and I/O integration than previous-generation MP chipsets.

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XEON

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Improve productivity and help lower costs with new Reliability/Availability/Serviceability (RAS) innovations.

The chips in the Dual-Core Intel Xeon Processor 7000 sequence are based on Intel's 90 nm wafer fabrication process. They benefit from Intel's dual-core technology, which helps increase compute power and throughput by up to 60% compared to the previous generation.[1]

This means they can handle larger peak demands and increase your return on investment. And they help deliver outstanding performance for 32-bit software and increased headroom for 64-bit applications, running both simultaneously. The result? An investment that helps lower your Total Cost of Ownership (TCO), while giving you the performance and flexibility you need to grow your business.

- Error Correcting Code (ECC): The system detects single-bit and double-bit errors and automatically corrects single-bit errors on internal data paths.
- Memory RAID: Similar to RAID for disks, Memory RAID uses partitions of the system memory as independent, redundant data stores to allow for reconstruction of the system data even in the event of a memory board failure.
- Memory mirroring: Splits the memory subsystem into two and duplicates the data in each half. The redundant memory image is used as a check against errors in the memory.
- Demand and patrol scrubbing: The system proactively searches the system memory, repairing correctable errors or permanently marking the memory location as unreadable.
- SMBus with PIROM and thermal sensor: This feature allows for scheduled service in the event of a system manufacturing defect or cooling device failure, going to a lower power state if a critical temperature is reached.
- Hot-plug I/O and memory ability: Add memory or I/O after installation without service interruption.
- DIMM sparing: Swaps "defective" DIMMs with installed but otherwise unused DIMMs.
- X8 single device data correction (X8 SDDC): Fixes the failure of an entire DRAM device on-the-fly without impacting the performance of the platform by removing a single DRAM from the memory map and recovering its data into a new device.

What is the 7000 Sequence?

Manufacturers in many industries use a product-numbering system to differentiate products within a product line or brand. This helps customers compare specific products that offer a variety of different features. The same is true with processors, especially in today's world when so many additional features contribute to performance above and beyond clock speed.

By changing how it identifies components on server platforms, Intel is making it easier for customers to take into account all the things that contribute to their overall experience — including features like architecture, cache, front side bus, and other Intel® technologies.

Intel offers four processor number sequences for server applications

Processor Sequence	Used For
Intel® Pentium® 4/Pentium® D processor 3000² sequence	Small business, entry or first server
Dual-Core Intel® Xeon® processor 5000² sequence	Volume DP servers/workstations based on the Intel Xeon processor
Dual-Core Intel® Xeon® processor 7000² sequence	Greater scalability with MP enterprise servers based on the Intel Xeon processor MP compared to previous-generation platforms
Intel® Itanium® 2 processor 9000² sequence	Maximum performance and scalability for RISC replacement usage

Boost performance with expanded bandwidth.

The system bandwidth of the Intel E8501 chipset is 12.8 GB/s — four times faster than previous Intel Xeon processor MP-based platforms. The chipset is designed with dual-independent 800 MHz system buses, each one architected to support two dual-core Intel Xeon processor 7000 sequences, enabling better throughput, faster access to memory, and shorter application response times. Extra bandwidth means your customers can process data transactions faster on fewer servers, helping to reduce the overhead costs of standard server reliability tools such as RAID.

Features	Benefits
Dual-Core Intel® Xeon® processor 7000[2] sequence	• Up to 60% higher performance versus previous-generation single-core processors[1]
Intel® Extended Memory 64 Technology[3]	• Enables extended memory addressability for server applications
Demand-Based Switching (DBS) with Enhanced Intel SpeedStep® technology	• Enables platform and software power management features to help lower average power consumption while helping to maintain application performance and acoustics
PCI Express* serial I/O	• Next-generation I/O capable of up to 8 GB/s peak bandwidth • Improved RAS features compared to PCI-X* • Lower latency compared to PCI-X for improved I/O performance • Software compatible with PCI-X to simplify parallel-to-serial transition
DDR2-400 memory	• Provides up to 20% increase in memory bandwidth over DDR1-333 • 30 to 40% lower power consumption vs. DDR1-333 on systems tested[5] • Increased DIMMs per system for enhanced memory scalability
Enhanced reliability and manageability	• Many memory controller features, together with PCI Express RAS features combine to help improve platform reliability vs. previous-generation platforms • Features include Error Correcting Code (ECC) system bus, memory RAID, and I/O and memory hot-plug • The Intel® E8501 chipset includes an SMBus port for remote management operation and support for a variety of third-party BMC (base management controller) and BIOS solutions
High-speed, 3-load front-side system bus (800 MHz)	• 12.8 GB/s—four times faster than previous Intel Xeon processor MP-based platforms with 400 MHz system bus
PIROM and thermal sensor	• Allows for scheduled service in the event of a system manufacturing defect or cooling device failure

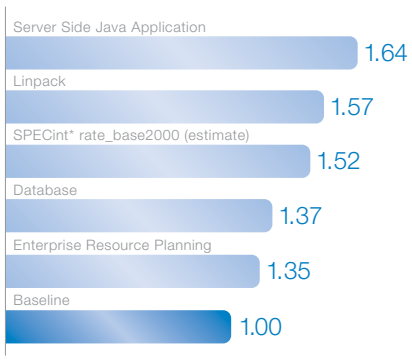
Products and technologies designed and validated together for greater business advantages.

The Intel E8501 chipset has up to four times the bandwidth of the previous Intel Xeon processor MP-based platforms.

Dual-Core Intel® Xeon® Processor 7000[2] Sequence

Server Platform Performance: Dual-core platform versus prior-generation single-core platform

DUAL-CORE INTEL® XEON® PROCESSOR 7041[2] VS. INTEL® XEON® PROCESSOR MP 3.33 GHZ 8MB L3 CACHE



Relative Performance: Higher is Better

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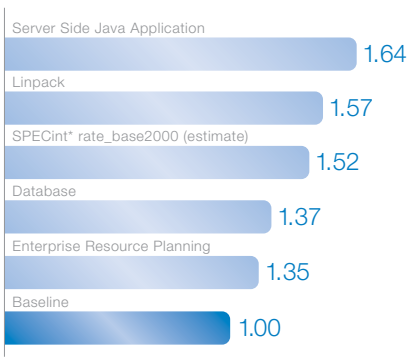

Relative Performance: Higher is Better

Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance.

Benchmark notes:

Dual-Core Intel® Xeon® Processor 7000 Sequence: Server Platform Performance

SPECint*_rate_base2000. Estimates based on Intel internal measurement (August 2005). Baseline Platform Configuration: Intel® Server System pre-production hardware with four 64-bit Intel® Xeon® Processor MP 3.33 GHz with 8 MB L3 Cache, E8500 Chipset, 667 MHz FSB; 8 GB memory; Hyper Threading ON; Windows* 2003 Enterprise Edition. SPECcpu2000 binaries built with Intel compiler version 8.1 for 32-bit Windows

New Platform configuration: Intel® Server System pre-production hardware with four Intel® Xeon® Processors 7041, 3.0 GHz with 2x2MB L2 Cache, E8501 Chipset, 800 MHz FSB; 2 GB memory; Hyper Threading OFF; Windows* 2003 Enterprise Edition. SPECcpu2000 binaries built with Intel compiler version 8.1 for 32-bit Windows

Linpack. Baseline Platform configuration: Intel internal measurement - Feb 2005; Intel® Harwich (SR6850HW4) Server Platform with four 64-bit Intel® Xeon® Processor MP 3.33 GHz with 8 MB L3 Cache, E8500 Chipset, 667 MHz FSB; Memory: 16 GB BIOS: SHW40.86B.B10.01.00.0031; HT disabled OS - Red Hat Enterprise Linux* AS release 3 (Taroon Update 3) 2.4.21-20.EL x86_64 GNU/Linux Workload: 5Kx5K through 44Kx44K matrix sizes used; Workload Type: Scalar. Intel Linpack 2.1.2

New Platform configuration: Intel internal measurement - August 2005; Intel® Server System Harwich 800T with four Intel® Xeon® Processors 7041, 3.0 GHz with 2x2MB L2 Cache, E8501 Chipset, 800 MHz FSB; Memory: 16 GB; HT enabled OS - Red Hat Enterprise Linux* AS release 4 2.6.9-5 EL x86_64 GNU/Linux Workload: 5Kx5K through 40Kx40K matrix sizes used; Workload Type: Scalar. Intel Linpack 2.1.2

Server-Side Java Application. This workload evaluates the performance of Server-side Java Application. Measured in Operations Per Second. Performance estimates based on Intel internal measurement.

Baseline Platform Configuration: Intel® Server System pre-production hardware with four 64-bit Intel® Xeon® Processor MP 3.33 GHz with 8 MB L3 Cache, E8500 Chipset, 667 MHz FSB; 8 GB memory; Hyper Threading ON; HWP and ASP enabled; Windows* 2003 Enterprise Edition. Application Server software: BEA JRockit* JVM for 32-bit Windows

New Platform configuration: Intel® Server System pre-production hardware with four Intel® Xeon® Processors 7041, 3.0 GHz with 2x2MB L2 Cache, E8501 Chipset, 800 MHz FSB; 2 GB memory; Hyper Threading ON; HWP and ASP disabled; Windows* 2003 Enterprise Edition. Application Server software: BEA JRockit* JVM for 32-bit Windows

Database. Intel internal application which evaluates the capacity of a database server in supporting transaction processing. Simulates execution of user transactions against a database in an order-entry environment. Measured in transactions per second.

Baseline Platform Configuration: Intel® SR6850HW4 Server System, BIOS: SHW40.86B.B13.01.00.0032, with four 64-bit Intel® Xeon® Processor MP 3.33 GHz with 8 MB L3 Cache, E8500 Chipset, 667 MHz FSB; Adjacent Sector Pre-fetch Enabled, Hardware Pre-fetch Disabled, 32 GB Memory. Microsoft Windows* 2003 Enterprise x64 Edition O/S build 1433 (SP1)

New Platform Configuration: Intel® SR6850HW4/M Server System (Harwich 800T), BIOS: SHW40.86B.B24.03.00.0058, with four Intel® Xeon® Processors 7041, 3.0 GHz with 2x2MB L2 Cache, E8501 Chipset, 800 MHz FSB; Hyper-Threading Enabled, Hardware Pre-fetch Disabled, Adjacent Sector Pre-fetch Disabled, Memory: 32 GB Microsoft Windows* Enterprise Server 2003, SP1-Build 1812, x86 Edition.

Enterprise Resource Planning. Workload emulates a SAP-based Sales and Distribution application and helps ERP. Measured in number of concurrent users supported. Performance estimates based on Intel internal measurement.

Baseline Platform Configuration: Intel Server Platform Harwich with four 64-bit Intel® Xeon® Processor MP 3.33 GHz with 8 MB L3 Cache, E8500 Chipset, 667 MHz FSB BIOS: SHW.86B.B10.01.00.0031, Hyper Threading: Enabled, Hardware Pre-fetch: Enabled, Adjacent Sector Pre-fetch: Enabled, Memory: 32 GB Operating system: SuSE Linux* Enterprise 9 for x86-64 SP2. Linux kernel 2.6.5-191-smp Application server: SAP* R/3 Enterprise v4.7 SR1 for x86-64

New Platform Configuration: Inter Server Platform Harwich 800 with four Intel® Xeon® Processors 7041, 3.0 GHz with 2x2MB L2 Cache, E8501 Chipset, 800 MHz FSB; BIOS: SHW40 Version 3.00, Hyper Threading: Enabled, Hardware Pre-fetch: disabled, Adjacent Sector Pre-fetch: disabled, Memory: 32 GB Operating system: SuSE Linux* Enterprise 9 for x86-64 SP2. Linux kernel 2.6.5-191-smp Application server: SAP* R/3 Enterprise v4.7 SR1 for x86-64

Dual-Core Intel® Xeon® Processor 7000 Sequence: Server Platform Scalability

SPECint*_rate_base2000. Estimates based on Intel internal measurement (August 2005). Platform configuration: Intel® Server System pre-production hardware with Intel® Xeon® Processors 7041, 3.0 GHz with 2x2MB L2 Cache, E8501 Chipset, 800 MHz FSB; 2 GB memory; Hyper Threading OFF; Windows* 2003 Enterprise Edition. SPECcpu2000 binaries built with Intel compiler version 8.1 for 32-bit Windows. Measurement done in 1, 2 and 4 processor configuration

Server-Side Java Application. Estimates based on Intel internal measurement (August 2005). Platform configuration: Intel® Server System pre-production hardware with four Intel® Xeon® Processors 7041, 3.0 GHz with 2x2MB L2 Cache, E8501 Chipset, 800 MHz FSB; 2 GB memory; Hyper Threading ON; HWP and ASP disabled; Windows* w2003 Enterprise Edition. Application Server software: BEA JRockit* JVM for 32-bit Windows. Measurement done in 1, 2 and 4 processor configuration

[1] Performance gains based on Intel internal measurements of Java performance. Baseline Intel Server platform contains four 64-bit Intel® Xeon® Processor MP 3.33 GHz/8M L3 Cache, Intel E8500 chipset, Intel Hyper Threading ON. The new Intel Server pre-production platform contains four Intel Xeon Processor 7041 with E8501 Chipset with Intel Hyper Threading ON. Actual results will vary by hardware and software configuration.

[2] Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See http://www.intel.com/products/processor_number for details.

[3] 64-bit Intel® Xeon® processors with Intel® EM64T requires a computer system with a processor, chipset, BIOS, OS, device drivers and applications enabled for Intel EM64T. Processor will not operate (including 32-bit operation) without an Intel EM64T-enabled BIOS. Performance will vary depending on your hardware and software configurations. Intel EM64T-enabled OS, BIOS, device drivers and applications may not be available. Check with your vendor for more information.

[4] Hyper-Threading Technology requires a computer system with an Intel® Xeon® processor supporting HT Technology and a HT Technology enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. See www.intel.com/homepage/land/hyperthreading_more.htm for additional information.

[5] Based on Intel power testing utilizing Intel® Xeon® processor 3.66 GHz with 667 MHz system bus. Dual-Core Intel Xeon processor 7041 expected to exhibit similar power consumption characteristics. Actual power savings will vary based on system configurations and workloads.

Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit http://www.intel.com/performance/resources/limits.htm or call (U.S.) 1-800-628-8686 or 1-916-356-3104.

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Relative performance for each benchmark is calculated by taking the actual benchmark result for the first platform tested and assigning it a value of 1.0 as a baseline. Relative performance for the remaining platforms tested was calculated by dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms and assigning them a relative performance number that correlates with the performance improvements reported.

SPECint2000* and SPECfp2000* benchmark tests reflect the performance of the microprocessor, memory architecture and compiler of a computer system on compute-intensive, 32-bit applications. SPEC benchmark tests results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of Intel microprocessor in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks; to evaluate the performance of systems they are considering purchasing.

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